

Financial Failure Analysis of Airline Companies by Altman Z" and Springate S Score Models

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Abstract

Financial failure is a risk that must be measured, audited, and controlled. This study measures and evaluates the financial failure risks of Turkish Airlines and Pegasus businesses. Altman Z" and Springate S Score methods were used in the study. In the context of descriptive and cross-sectional research methods, the analysis and interpretation of data were carried out by systematically addressing quantitative data. Therefore, the financial performance of the firms in the sample was calculated and analyzed using the Altman Z" Score and Springate S Score. The main reason for choosing these two methods is to create a combination of the most commonly used quantitative methods in the literature to objectively evaluate the financial health and performance of firms. Thus, the aim was to increase the reliability of the results and provide concrete data about the financial situation. The equations in the relevant methods were used as variables, and financial statement data between 2012 and 2023 were analyzed. The results showed that there was a general risk of financial failure, and evaluations were conducted. The results obtained were aimed at guiding researchers, industry officials, and people interested in the subject.

This study was derived and expanded the summary paper titled "Measuring the Risks of Financial Failure of Airline Companies: The Case of Pegasus and Turkish Airlines", presented at "The 6th International Aviation Management Conference" between 19-20 December 2023.

1. Introduction

The aspiration for flight has persisted throughout human history, dating back to the earliest civilizations. Humans have long harbored dreams of flight, conducting various experiments inspired by observations of airborne creatures. Mythological narratives across civilizations often feature heroic figures capable of flight. However, the first practical designs for achieving flight emerged during the Renaissance, notably pioneered by Leonardo da Vinci. After this period, advancements in flight were pursued through experiments with hot air balloons and gliders. A significant milestone occurred in the late nineteenth century with the Wright brothers in Virginia developing the first piloted flying vehicle. The era of aviation saw rapid progress, particularly highlighted by the utilization of over 80,000 aircraft during World War I. Civil aviation took off in the early twentieth century, spearheaded by Germany. The aviation industry experienced exponential growth, leading to the production and commercialization of long-range aircraft prior to World War II. The year 1938 marked a pivotal moment, with Germany alone transporting nearly 320,000 passengers through its airports (Schmitt et al., 2016). This period witnessed revolutionary advancements in aviation within a remarkably short span of time. Today, the widespread adoption of air transportation has significantly

reduced temporal and spatial barriers in both passenger and freight movements. This trend has not only facilitated global connectivity but has also played a crucial role in fostering globalization by bridging societal divides.

In recent years, the aviation industry has undergone significant development, driven by the increasing trend of globalization. This development has notably contributed to the economic growth of nations, particularly through the expansion of the tourism sector. Advancements in aircraft technologies, marketing strategies, and information technologies have collectively transformed air travel from being a costly alternative to a widely preferred mode of transportation for passengers (Adedoyin et al., 2020). Countries are increasingly favoring air transportation for several reasons. These include concerns over high mortality rates associated with road transportation, uncertainties surrounding oil supply, environmental issues such as air and noise pollution, inadequate transportation infrastructure, and the escalating number of vehicles on roads (Moriarty, 2021). As of 2022, Turkey stands out globally, ranking eighth in the world and fourth in Europe with a total of fifty-seven airports dedicated to civil aviation. Notably, Istanbul Airport claimed the title of Europe's busiest airport in terms of passenger traffic in 2022, underscoring Turkey's growing significance in the global

aviation landscape. Also, Istanbul Airport have been an important stop center.

Air passenger traffic has lost around 60% due to the Covid-19 pandemic. However, Turkey was less affected by the impact of the pandemic on passenger traffic compared to Europe. The measures taken and the successes achieved in the fight against the pandemic are shown as the justification for this situation (DHMI, 2022). The airline industry has been the sector most affected by the restrictions arising from the pandemic. These restrictions have increased costs and reduced passenger numbers. In the future, some experts and the World Health Organization (Prater, 2024) show that the airline industry may face difficult times again, as new pandemic will emerge. Due to the impact of the Covid-19 pandemic that occurred in 2019, more than sixty-four airline companies in the world went bankrupt. It is stated that the biggest reason why these companies go bankrupt is that the companies do not have strong financial structures due to the decrease in the number of passengers (Buckley, 2023). For this reason, determining in which aspects the sector is experiencing financial problems will enable companies to be prepared for negative situations that may occur in the future, such as pandemics, crises or war situations. In this way, companies will be able to identify their financial shortcomings and prevent losses for both them and their investors.

Recent trends highlight that airline companies, facing escalating costs and financial pressures, are increasingly adopting cost-cutting measures across their maintenance, procurement, and training policies. However, such measures may potentially compromise flight safety, posing security vulnerabilities (Fardnia et al., 2021). It is emphasized that financially robust companies with strong funding and high profitability are less likely to resort to measures that jeopardize passenger safety. Therefore, assessing companies' financial performance is crucial for uncovering potential risks of operational failure.

This study focused on Turkish Airlines (THYAO) and Pegasus Air Transportation (PGSUS), two airline companies operating within the Transportation and Storage Sector (XULAS) of Borsa Istanbul (BIST). The aim was to assess the financial failure risk of these companies (THYAO and PGSUS) using financial statement data from 2012 to 2023. The Altman Z" and Springate S Score models were employed to measure financial failure risk. The study progressed through sections covering literature review, methodology, analysis, and findings; presenting the results of the applied models; and offering various recommendations to investors, company executives, and stakeholders based on the evaluations.

2. Literature Review

Finance examines the activities carried out to manage funds effectively and ensure financial continuity. Financial success is important for individuals, businesses and governments. A sustainable and continuous structure can be established by creating effective financial strategies and monitoring the realization of the developed methods. Otherwise, the financial failure that occurs covers all processes ranging from the inability of businesses to carry out daily activities to the bankruptcy process. Literature extensively examines the financial situations of companies within the aviation sector, with a predominant focus on assessing their financial performance. These studies aim to identify the most effective financial ratios that contribute to enhanced financial

performance. Recent literature in the sector predominantly delves into analyses of financial failure and performance specifically concerning two airline companies listed on the BIST. These analyses typically leverage company-specific ratios to evaluate financial performance and failure, employing methodologies such as the Altman Z" and Springate S Score models for assessing financial failure. For performance ranking, Multi-Criteria Decision Making Methods (MCDM) are often favored, with the TOPSIS method being the most used among MCDM techniques. Additionally, other MCDM methods like EDAS, WASPAS, GRA, and ENTROPY have also been applied in studies within this domain.

However, it is noted that there is a scarcity of studies specifically focusing on measuring the financial failure of companies within the aviation sector. The analysis conducted within this context aims to address these literature gaps and provide essential information required by stakeholders in the business ecosystem.

The Altman Z Score model, developed by Edward I. Altman in 1968, serves as a tool for assessing financial failure. This model defines score ranges within which a company's score indicates potential financial distress (Altman, 1968). Similarly, the Springate S Score model, developed by Springate in 1978, also identifies financial failure by setting a score threshold below which companies are considered at risk (Dizgil, 2018).

Financial performance measurement has long been a subject of research, involving analysis across various sectors to determine companies' standings and positions over time. Numerous studies in the literature delve into assessing the financial performance of airline companies, including THYAO and PGSUS. These studies were reviewed during the literature analysis to evaluate the financial performance of both companies over time, enabling more detailed insights into potential financial failure.

Ömürbek and Kınay (2013) utilized the TOPSIS method to evaluate the financial performance of airline companies. Their study compared the financial performances of two companies listed on the BIST and Frankfurt Stock Exchange using data from 2012, concluding that the BIST-listed airline company exhibited higher financial performance.

Akgün and Temür (2016) emphasized the significant contributions of aviation sector development to the country's tourism sector. Their research analyzed the financial performances of companies in the aviation sector, particularly focusing on THYAO and PGSUS for the years 2010-2015. Comparing twelve ratios using the TOPSIS method, they found that PGSUS outperformed THYAO in 2011, 2013, and 2014, with PGSUS's best performance observed in 2014 and THYAO's in 2012.

Gümüş and Bolel (2017) conducted a financial analysis of PGSUS and THYAO for the period from 2010 to 2015, utilizing ratio analysis. The study noted that THYAO consistently struggled with liquidity ratios throughout the years. In contrast, PGSUS, although starting with low liquidity ratios in 2010, significantly improved in this aspect by 2015. Both companies were observed to collect their receivables in less than a month without encountering difficulties, primarily financing their assets through foreign resources. Notably, PGSUS's financial performance surpassed THYAO's after 2012.

Avcı and Çınaroğlu (2018) evaluated the financial performance of five prominent European airline companies, including THYAO, using data from 2012 to 2016. They employed the Analytic Hierarchy Process (AHP) and TOPSIS

methods in their analysis. The results positioned Ryanair as the top-performing company among the five, followed by EasyJet Airlines, with THYAO ranking third. The study highlighted the success of companies adopting a "low-cost transportation" strategy, contributing to their strong performance.

Kiracı and Bakır (2018) examined the financial performance of thirteen leading global passenger airlines between 2005 and 2012, highlighting the impact of the 2008 global crisis on airlines, particularly noticeable from 2010 to 2012. Notable performance shifts were observed among companies, with United Continental, Delta Air, China Eastern, and China Southern displaying improved performance during the crisis period compared to earlier years.

Kiracı and Asker (2018) investigated financial failure among seventeen airline companies using Altman Z and Springate S scores, analyzing data from 2012 to 2016. The research indicated that not all airlines adopting cost leadership strategies achieved substantial financial gains, with some companies falling short in this aspect.

Finally, Kızıl and Aslan (2019) analyzed the financial performance of two aviation companies listed on the BIST between 2013 and 2017, focusing on liquidity and debt ratios. Their findings indicated that PGSUS outperformed THYAO, especially in liquidity and debt ratios, while both companies exhibited fluctuating profitability ratios and made fixed asset investments primarily through long-term resources.

Deste and Şimşek (2019) conducted a comparative analysis of logistics performance among companies in the aviation sector, employing the ENTROPY and TOPSIS methods. They evaluated eleven indicators, including labor productivity, on-time departures, and average ticket prices, to assess logistics performance. The study highlighted differences in company performance based on criterion weighting, with closely ranked values indicating subtle variations in performance among companies.

Kiracı and Asker (2019) discussed the shift towards aircraft leasing in the aviation industry due to substantial fixed asset investments. They applied the TOPSIS method to evaluate the financial performance of five aircraft leasing companies for the period 2013-2017. The analysis revealed that CAPITAL LEASE demonstrated superior performance in the initial two years, followed by AIR LEASE. Notably, AERCAP HOLDINGS ranked second in 2013 but experienced a decline in subsequent years.

Güngör and Armutlu (2020) conducted a financial failure analysis specifically targeting the sixteen most successful airline companies among the top hundred global airlines. The study utilized Altman Z" score variables and regression analyses, revealing significant insights into the industry's vulnerability to crises, such as plane crashes or employee strikes, impacting companies' financial success. Among financial ratios, the study highlighted the importance of short-term debt payment ability, leverage ratio, and fixed asset profitability in achieving financial success.

Keleş and Özulucan (2020) conducted a ratio analysis to assess the financial situation of two airline companies in 2018. They found that while PGSUS exhibited stronger liquidity ratios, THYAO showcased better profitability and activity ratios. Both companies displayed similar leverage ratios.

Macit and Göçer (2020) utilized the GRA method to analyze financial performance using 2018 data, determining that PGSUS outperformed THYAO.

Ersoy (2020) measured the financial performance of eight companies, including PGSUS and THYAO, listed in the

transportation index on BIST, using Gray Relational Analysis (GRA) and financial ratios for 2016-2018. The analysis indicated THYAO's superior performance over PGSUS in 2016 and 2018, while PGSUS exhibited stronger financial performance in 2017.

In a study by Köse (2020), the financial failure of THYAO PGSUS for the years 2014-2018 was examined. The analysis utilized the Altman Z, Springate S, and Fulmer H models. The results indicated that both companies were classified as financially distressed according to the Altman Z and Springate S models; however, the Fulmer H model suggested otherwise, attributing this discrepancy to the Fulmer H model's incorporation of more variables.

The mitigation of risks significantly impacts the financial success of airline companies. In a study conducted by the Purchaser in 2021, data from eleven airline companies spanning 2009 to 2019 was analyzed using the Altman Z" score method. The research concluded that factors such as cost per kilometer of available seating, labor expenses, and fuel costs exerted a negative influence on financial stability, highlighting the importance of risk assessment in averting financial distress.

Similarly, Özbek and Ghouchi (2021) analyzed the financial performance of five airline companies over a decade leading up to 2018, employing the Weighted Aggregated Sum Product Assessment (WASPAS) and Evaluation based on Distance from Average Solution (EDAS) methods. Their findings echoed those of Avcı and Çınaroğlu (2018), ranking Ryanair as the best performer and Lufthansa at the bottom.

In this study, Dağlı (2021) utilized the TOPSIS method to assess the financial status of the seven most successful companies in Europe, including PGSUS and THYAO, before and after the Covid-19 pandemic. Quarterly balance sheet data were used for the analysis. PGSUS ranked first in the second quarter of 2019, sixth in the fourth quarter of 2019, and second in the second quarter of 2020. On the other hand, THYAO ranked sixth, fourth, and third respectively during the same periods. The study indicated that PGSUS was significantly affected by the Covid-19 outbreak in 2019, but its financial performance recovered by the second quarter of 2020.

Alicı (2021), a study was conducted to measure the financial failure risks of airline companies. Within the scope of the study, the study was carried out using 11 companies with data between 2009 and 2019. As a result of the analyzes carried out within the scope of the study, explanations and evaluations were made regarding the variables.

Köse (2021) focused on specific financial ratios such as "Cost per Available Seat Kilometer, Revenue per Available Seat Kilometer, Revenue per Passenger, Efficiency, Occupancy Rate, Break-even occupancy rate," which are not commonly included in other studies. Using the TOPSIS method, financial performance was assessed between 2014 and 2019, revealing that THYAO exhibited more successful financial performance compared to PGSUS.

Ağırkaya and Keleş (2022) aimed to gauge the impact of the Covid-19 pandemic on the financial performance of the aviation sector. The study highlighted issues faced by airline companies during the pandemic, such as difficulties in paying short-term debts, increased dependence on foreign resources and financing, heightened long-term borrowing, negative effects on asset turnover rates, and net losses incurred in 2020.

Karadeniz and Aydın (2023) evaluated the financial performance of sixty-four international airline companies between 2016 and 2021 using ratio analysis. They noted that while the cash ratio, a component of liquidity ratios, remained

high, other ratios were found to be inadequate. Insufficient net working capital, heavy reliance on foreign resources, and limited internal resources were also highlighted. The study raised concerns about the aviation industry's ability to secure new resources due to heightened risk levels, particularly exacerbated by the challenges posed by the Covid-19 pandemic.

The study contributes to the analysis of two different methods with current data for two different companies operating in the XULAS sector. The measurement of the pandemic effect, comparative evaluation of the methods and comments and evaluations made to the sector enterprises are also among the contributions of the study.

3. Method of the Study

In this study, the financial risk of failure for Turkish Airlines and Pegasus, companies operating in the aviation sector, was analyzed. A dataset was compiled using financial statements from 2012 to 2023. Financial statement data was sourced from the Public Disclosure Platform, IS Investment, and Fintables (KAP, 2024; IS Investment, 2024; Fintables, 2024). Table 1 presents the companies in the BIST Transportation and Storage (XULAS) sector, which includes the sampled companies in this study. The reason for choosing the relevant sector is that the impact of the pandemic can be clearly seen. The impact of the pandemic, which has negatively affected almost all sectors, on aviation companies has been measured in this way. Another reason why the aviation sector is preferred is that the sector plays a critical role in the growth of economies and global trade. Especially in the pre- and post-pandemic period, changes and developments in the aviation sector are of great importance in terms of their impact on financial performance. In this context, the aviation sector was selected for the general financial health analysis.

In addition, two companies operating in the sector and carrying out passenger transportation were analyzed. The reason for this is the similarities in the business lines and financial structures of the relevant companies. THYAO and PGSUS are among the largest and best-known airlines in Turkey. In addition, to observe the impact of the pandemic more clearly, only passenger transportation companies were preferred among the companies in the BIST Transportation and Storage (XULAS) sector.

Table 1. BIST Transportation and Storage Sector (XULAS)

BEYAZ	Beyaz Fleet Car Rental
CLEBI	Celebi Air Service
GSDDE	GSD Marine
GRSEL	Gürsel Tourism Transportation
PASEU	Pasifik Eurasia Logistics Foreign Trade
PGSUS	Pegasus Air Transportation
RYSAS	Reysaş Transportation and Logistics
TLMAN	Trabzon Port Management
TUREX	Tureks Tourism Transportation
THYAO	Turkish Airlines

Source: Public Disclosure Platform (2024)

Altman Z" and Springate S Score models were utilized for detecting financial failure. These models were selected due to their widespread use in the literature. Employing two models

allowed for a comparative analysis between them. While the Altman Z" score evaluates the general financial condition of the firm by considering various financial ratios, the Springate S score provides another perspective that examines the liquidity, profitability and financial stability of the firm. This diversity allows our study to provide a more comprehensive and balanced analysis.

The models developed by Altman over different years have been instrumental in assessing the risk of financial failure across various sectors, including public companies in manufacturing and service industries. Detecting financial failure risk is crucial for business sustainability and continuity (Altman, 1968; Altman, 2000; Altman & Hotchkiss, 2006). Given that this study focused on service businesses, the risk of financial failure was evaluated using the Altman Z" Score model tailored for service industries, as presented in Equation 1.

$$Z'' \text{ Score} = 6.56T_1 + 3.26T_2 + 6.72T_3 + 1.05T_4 \quad (1)$$

T_1 = Net Working Capital / Total Assets

T_2 = Retained Earnings / Total Assets

T_3 = Earnings Before Interest and Tax / Total Assets

T_4 = Equity Book Value / Total Debt Book Value

The Altman model resulted in score ranges, where a Z" Score below 1.10 indicated financial failure, a score between 1.10 and 2.60 reflected uncertainty, and a value exceeding 2.60 signified financial success.

The Springate S Score model indicates that businesses with a score below 0.862 are at risk of financial failure, while those with a score above 0.862 are deemed financially successful (Springate, 1978). The model is represented by Equation 2.

$$S \text{ Score} = 1.03X + 3.07Y + 0.66Z + 0.40Q \quad (2)$$

X = Working Capital / Total Assets

Y = Earnings Before Interest and Tax / Total Assets

Z = Profit Before Tax / Short Term Liabilities

Q = Sales / Total Assets

4. Analysis and Findings

The sample was created by obtaining data from the THYAO and PGSUS enterprises between the years 2012-2023. Within the scope of this study, the Altman Z" and Springate S Score models were applied to the THYAO company. The values and results obtained from this application are listed in Table 2.

The table above shows the Altman Z" and Springate S score values of Turkish Airlines (THYAO) between 2012-2023. As stated before, the Altman Z" score is generally below 1.1, indicating a risk of bankruptcy, between 1.1-2.6 indicates a gray zone; and above 2.6 indicates a healthy financial structure. Scores were generally below 1.1 2012-2016, indicating that THYAO was at a high risk of bankruptcy. Although it exceeded 1.1 in 2017 (1.161), the company was still in the grey zone. In 2018, although it was between 1.0-1.1, the company was still in the gray zone, but due to the impact of the pandemic in 2019-2021, the scores dropped significantly and the company remained at low levels, such as 0.291 and 0.466, indicating a serious risk of bankruptcy. Recovery was observed in 2022 and 2023. In 2023, the score increased to 1.336, and it is seen that the company's financial situation has improved somewhat, but it is still close to a risky area.

Table 2. THYAO Altman Z" Score and Springate S Score Results

THYAO	2012	2013	2014	2015	2016	2017
T1	-0.035	-0.083	-0.061	-0.044	-0.049	-0.037
T2	0.074	0.085	0.090	0.098	0.118	0.111
T3	0.116	0.097	0.096	0.105	0.040	0.109
T4	0.288	0.274	0.287	0.296	0.275	0.294
Z" Score	1.094	0.672	0.841	1.049	0.623	1.161
THYAO	2018	2019	2020	2021	2022	2023
T1	-0.032	-0.048	-0.089	-0.070	-0.033	-0.014
T2	0.075	0.082	0.088	0.031	0.033	0.063
T3	0.105	0.093	0.055	0.082	0.138	0.114
T4	0.287	0.278	0.211	0.256	0.314	0.435
Z" Score	1.039	0.868	0.291	0.466	1.150	1.336
THYAO	2012	2013	2014	2015	2016	2017
X	-0.035	-0.083	-0.061	-0.044	-0.049	-0.037
Y	0.061	0.048	0.045	0.052	-0.013	0.052
Z	0.307	0.145	0.266	0.348	0.000	0.050
Q	0.761	0.724	0.741	0.591	0.443	0.567
S Score	0.753	0.558	0.652	0.744	0.309	0.555
THYAO	2018	2019	2020	2021	2022	2023
X	-0.032	-0.048	-0.089	-0.070	-0.033	-0.014
Y	0.057	0.034	-0.007	0.038	0.084	0.068
Z	0.192	0.143	-0.129	0.102	0.334	0.341
Q	0.563	0.497	0.240	0.268	0.527	0.466
S Score	0.668	0.550	0.200	0.513	0.846	0.819

According to the Springate model, values below 0.862 indicate that a company may experience financial difficulties. The decrease in S scores from 0.753 to 0.309 between 2012 and 2016 indicates that THYAO was at risk of financial distress. A recovery trend was observed in 2017 and 2019; the score varied between 0.555 and 0.668, and the company's financial health improved. In 2020 and 2021, low scores, such as 0.200 and 0.513, were observed during the pandemic, indicating that the company experienced serious difficulties during this period. However, recovery was experienced again in 2022 and 2023. In 2023, the score increased to 0.819, indicating that the company began to recover its financial health.

The figures representations of the Z" and S score results of the business are available below.

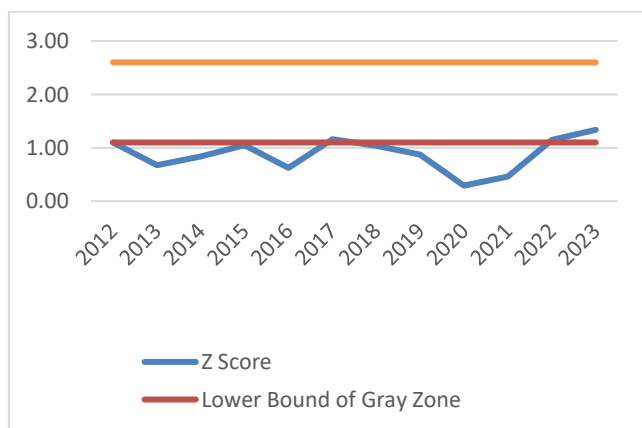


Figure 1. THYAO Altman Z" Score Results

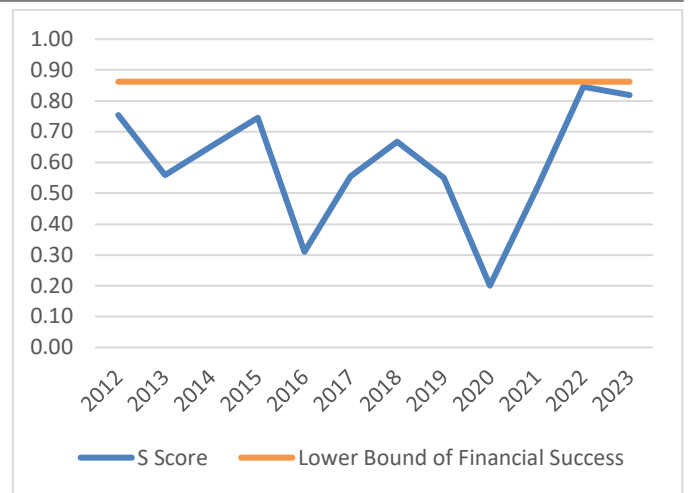


Figure 2. THYAO Springate S Score Results

THYAO experienced serious financial difficulties, especially during the pandemic period (2020-2021), but showed recovery in both the Altman Z" score and Springate S score in 2022 and 2023. However, the company's financial situation cannot be considered completely solid when looking at both scores; bankruptcy risk is still at a moderate level, and it is going through a period that needs to be monitored carefully.

The results of the Altman Z" and Springate S Score model applications for the PGSUS business are presented in Table 3.

Table 3. PGSUS Altman Z" Score and Springate S Score Results

PGSUS	2012	2013	2014	2015	2016	2017
T1	-0.090	0.155	0.184	0.205	0.075	0.153
T2	0.005	0.039	0.065	0.091	0.086	0.044
T3	0.139	0.113	0.139	0.109	0.021	0.098
T4	0.148	0.327	0.330	0.354	0.279	0.308
Z" Score	0.514	2.244	2.702	2.747	1.208	2.127
PGSUS	2018	2019	2020	2021	2022	2023
T1	0.063	0.063	-0.034	0.000	0.000	0.054
T2	0.061	0.043	0.077	0.005	-0.018	0.027
T3	0.097	0.171	0.028	0.042	0.148	0.103
T4	0.272	0.254	0.185	0.130	0.188	0.271
Z" Score	1.550	1.971	0.413	0.434	1.129	1.418
PGSUS	2012	2013	2014	2015	2016	2017
X	-0.090	0.155	0.184	0.205	0.075	0.153
Y	0.091	0.074	0.092	0.066	-0.019	0.057
Z	0.289	0.226	0.161	0.184	-0.138	0.326
Q	0.647	0.536	0.665	0.651	0.481	0.477
S Score	0.778	0.935	0.979	0.935	0.328	0.948
PGSUS	2018	2019	2020	2021	2022	2023
X	0.063	0.063	-0.034	0.000	0.000	0.054
Y	0.058	0.098	-0.047	-0.012	0.101	0.065
Z	0.153	0.293	-0.311	-0.162	0.319	0.272
Q	0.422	0.367	0.104	0.135	0.319	0.238
S Score	0.743	0.958	0.016	0.258	0.920	0.834

The table shows the Pegasus (PGSUS) Altman Z" and Springate S score values between 2012-2023. These scores were used to evaluate a company's financial health. While the Altman Z" score measures the risk of bankruptcy, the Springate S score predicts whether a firm will experience financial distress. The Z score between 0.514 and 2.244 between 2012-2013 shows that Pegasus experienced significant fluctuations in its financial structure during these years. It achieved a high score of 2.244 in 2013. This may be due to Pegasus's public offering of BIST in 2013 or the fact that it started a strategy to expand its fleet and routes in 2013. The scores increased to 2.702 and 2.747 in 2014-2015, indicating that the company's financial structure was strong. In 2016-2019, the Z-score indicated that the company's solid financial structure continued. During this period, the score ranged between 1.208 and 2.127, indicating a transition between the grey zone and financial health. In 2020-2021, due to the impact of the pandemic, the Z score fell to low levels of 0.413 and 0.434, indicating a serious risk of bankruptcy. In 2022-2023, the company showed signs of recovery, and the Z score was 1.129 and 1.418, respectively, but it is still not in a completely safe zone and can be said to be in a situation that needs to be monitored carefully.

In 2012-2013, the S score ranged between 0.778 and 0.935, indicating that Pegasus was far from experiencing financial distress. In 2014-2015, the scores increased to 0.935 and 0.979, respectively, indicating a financially strong period. In 2016-2017, the scores fluctuated between 0.328 and 0.948, and, although a decrease was observed, especially in 2016, the company generally remained free of financial distress. to 2018-2019, the S score fluctuated between 0.743 and 0.958, indicating that the financial structure of Pegasus was strong during this period. In 2020-2021, due to the impact of the pandemic, the S score decreased to 0.016 and 0.258, indicating that the company was experiencing serious financial difficulties. In 2022 and 2023, the S score recovered and increased to 0.920 and 0.834, respectively, indicating that the company has improved its financial structure but still needs to be monitored carefully.

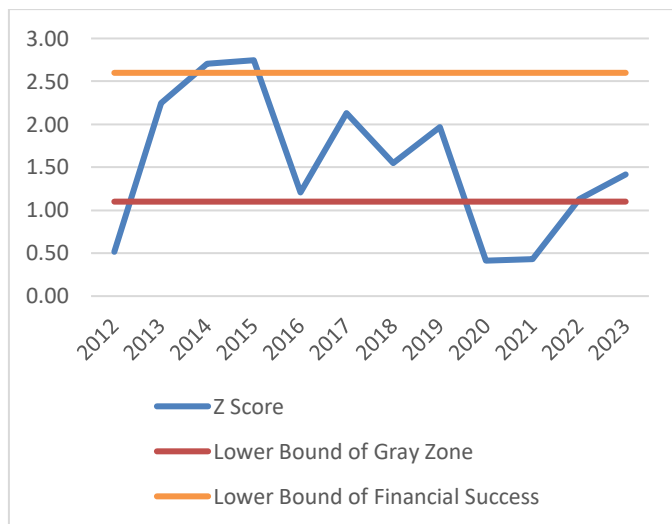


Figure 3. PGSUS Altman Z" Score Results

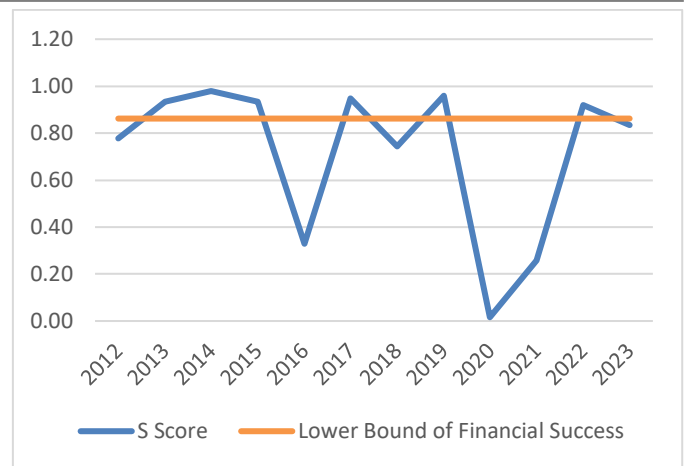


Figure 4. PGSUS Springate S Score Results

Pegasus experienced serious declines in both the Altman Z" score and the Springate S score due to the pandemic, especially in 2020-2021. However, there has signed of recovery by 2022 and 2023. According to the Z-score, it is still in the gray zone and cannot be said to be completely away from the risk of bankruptcy. However, according to the S-score, it recovered and moved away from the risk of financial distress. The company's financial situation has improved, but the risk elements continue.

5. Result and Discussion

The objective of this study was to assess the risk of financial failure and its impact on selected companies. Specifically, Turkish Airlines (THYAO) and Pegasus (PGSUS), operating within the BIST Transportation and Storage Sector, were chosen for the analysis. Financial data spanning from 2012 to 2023 were collected, and both the (Altman Z" Score) and (Springate S-Score) models were applied for comparative evaluation.

Utilizing these two models facilitates a thorough comparison of companies' financial health. The findings indicate that THYAO has consistently faced the risk of financial failure across the years, as indicated by both models, with the last two years placing it in an uncertain position. On the other hand, PGSUS demonstrates a lower risk of financial failure than THYAO, showcasing successful years, particularly evident in the S Score model's assessments. In recent years, PGSUS has either shown success or remains in an uncertain zone regarding financial failure risk. Kızıl and Aslan (2019) emphasize that the financial ratios of PGSUS are better than those of THY; Macit and Göçer (2020) emphasize that PGSUS performs better than THYAO and support the results obtained from our study. However, Köse (2021) yielded different results.

THYAO and Pegasus experienced serious declines in both the Altman Z" score and the Springate S score due to the pandemic, especially in 2020-2021. However, these companies signed recoveries by 2022 and 2023. The fact that the effects of Covid-19 have decreased for both companies in the recent period is similar to that of Dağlı (2021).

An overarching conclusion is that both the companies are susceptible to financial failure. PGSUS's emphasis on cost-effectiveness appears to yield more favorable outcomes in managing financial risks, possibly due to differing strategic approaches between the two companies. (Avcı and Çınaroğlu, 2018) supports that the "low-cost transportation" strategy is an important indicator of financial success. It is important to

note that future investments, profit distribution strategies, and financial policies can impact these scores, highlighting the dynamic nature of risk management within businesses. Furthermore, the study emphasizes the vulnerability of airlines to external factors such as pandemics, wars, and crises, necessitating heightened precautionary measures compared to other sectors. Effective risk management involves vigilant monitoring through early warning systems and development of proactive policies. Predicting financial failure, ranking financial performance, and conducting sectoral analyses are vital to ensuring business continuity.

When the findings are evaluated, it is seen that two companies operating in the passenger transportation sector and the XULAS sector generally carry a risk of financial failure. The main reason for carrying the relevant risk is the data obtained from the financial statements. The financial success of relevant companies is important because they are publicly traded, operating in an important sector, and their business volume. However, reasons such as the company maintaining its sustainable structure, making investments, and the fact that the investment cost will be obtained in the following periods are also important for interpreting financial failure. In this context, companies must review their risk management strategies, strengthen investment and financial planning, improve financial monitoring and reporting systems, and increase the use of predictive analysis.

The most important contribution of this study to the literature is the comparative analysis of the two models with the current data. Although a full comparison is not made because the methods, variables, and years used in the literature are different, the necessity of managing the risk of financial failure for companies is also expressed in this study. Turkey's uncertainty index significantly affects the financial performance of the firms included in the sample between 2012 and 2023. The pandemic period, especially in 2020-2021, combined with the high uncertainty index, has caused serious declines in the financial indicators of both companies. During this period, both the Altman Z' score and the Springate S score of the firms decreased significantly, and the firms faced financial difficulties. However, the improvement in Turkey's uncertainty index in 2022 and 2023 signals a recovery in the financial performance of both companies. When the synergy between the fluctuations in Turkey's uncertainty index and the financial situation of both companies is considered, Turkey's uncertainty index can be included as an independent variable in future studies on the subject.

A key recommendation of this study is to explore alternative methods and conduct comparative analyses to validate the findings and enhance our understanding of financial risk management in same-sector firms.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

References

- Adedoyin, F. F., Bekun, F. V., Driha, O. M., & Balsalobre-Lorente, D. (2020). The Effects of Air Transportation, Energy, ICT And FDI On Economic Growth In The Industry 4.0 Era: Evidence From The United States. *Technological Forecasting and Social Change*, 160, 120297.
- Ağırkaya, M. B., & Keleş, D. (2022). Havayolu Yolcu Taşımacılığı Sektörünün Finansal Performans Göstergelerinin Makroekonomik Analizi: Oran Analizi Yöntemi ile Covid-19 Süreci ve Öncesine İlişkin Bir Karşılaştırma [Macroeconomic Analysis of Financial Performance Indicators of The Airline Passenger Transport Industry: A Comparison with The Ratio Analysis Method and The Covid-19 Process And Before]. *Mali Çözüm Dergisi*, 32, 151–170.
- Akgün, M., & Temür, A. S. (2016). BIST Ulaştırma Endeksine Kayıtlı Şirketlerin Finansal Performanslarının TOPSIS Yöntemi İle Değerlendirilmesi [Evaluation of Financial Performance with TOPSIS Method Of Companies Which Are Listed in Transportation Index In The Istanbul Stock Exchange]. *Uluslararası Yönetim İktisat ve İşletme Dergisi*, 12(12), 173–186.
- Alici, A. (2021). Havayolu İşletmelerinde Finansal Başarısızlık Riskinin Belirleyicileri [Determinants of financial failure risk in airlines]. *International Journal of Aeronautics and Astronautics*, 2(2), 28–40.
- Altman, E. I. (1968). Financial Ratios, Discriminant Analysis and The Prediction of Corporate Bankruptcy. *The Journal of Finance*, 23(4), 589–609.
- Altman, E. (2000). Predicting Financial Distress of Companies: Revisiting The Z-Score and Zeta Models. New York: Stern School of Business, New, 1-54.
- Altman, E. & Hotchkiss, E. (2006). *Corporate Financial Distress and Bankruptcy*. New York: John Wiley & Sons, Inc.
- Avcı, T., & Çınaroğlu, E. (2018). AHP Temelli TOPSIS Yaklaşımı ile Havayolu İşletmelerinin Finansal Performans Değerlemesi [Financial Performance Evaluation of Airline Companies by AHP Based TOPSIS Approach]. *Cumhuriyet Üniversitesi Journal of Economics & Administrative Sciences (JEAS)*, 19(1).
- Buckley, J. (2023, February 11). How the pandemic killed off 64 airlines. CNN Travel. <https://edition.cnn.com/travel/article/pandemic-airline-bankruptcies/index.html>
- Dağlı, D. (2021). Havayolu İşletmelerinin Covid-19 Öncesi ve Covid-19 Sürecindeki Finansal Performanslarının TOPSIS Yöntemi ile Değerlendirilmesi [Evaluation of the Financial Performance of Airlines Before and During the Covid-19 Process with TOPSIS Method]. *İşletme Araştırmaları Dergisi*, 13(3), 2242–2255.
- Deste, M., & Şimşek, A. İ. (2019). Havayolu Şirketlerinin Lojistik Performanslarının ENTROPI ve TOPSIS Yöntemleri Kullanılarak Karşılaştırılması [Comparison of Companies Of Airline Passenger Transportation Sector By Using ENTROPY And TOPSIS Methods In Terms Of Logistics Performance]. *Journal of Management and Economics Research*, 17(1), 395–411.
- DHMİ. (2022). General Directorate of State Airports Authority. Airline Sector Report. Strategy Development Department, Ankara. Accessed from the address: <https://www.dhmi.gov.tr/Lists/HavaYoluSektorRaporlari/Attachments/16/2022-Havayolu-Sektor-Raporu.pdf>
- Dizgil, E. (2018). BIST Ticaret Endeksinde Yer Alan Şirketlerin Springate Finansal Başarısızlık Modeli İle Incelenmesi [Investigation of The Companies in The Bist Trade Index With Springed Financial Failure Model]. *Bilecik Şeyh Edebali Üniversitesi Sosyal Bilimler Dergisi*, 3(2), 248–267.
- Ersoy, N. (2020). Finansal Performansın Gri İlişkisel Analiz Yöntemi İle Değerlendirilmesi: Borsa İstanbul Ulaştırma

- Endeksi'ndeki Şirketler Üzerine Bir Araştırma [Evaluation of Financial Performance with Grey Relational Analysis Method: A Research Study on Companies in Borsa Istanbul Transportation Index]. *Muhasebe ve Finansman Dergisi*, 86, 223–246.
- Fardnia, P., Kaspereit, T., Walker, T., & Xu, S. (2021). Financial performance and safety in the aviation industry. *International Journal of Managerial Finance*, 17(1), 138–165.
- Fintables (2024). Balance Sheet Analysis. Accessed from the address: <https://fintables.com/bugun>
- Gümüş, U. T., & Bolel, N. (2017). Rasyo Analizleri Ile Finansal Performansın Ölçülmesi: Borsa İstanbul'da Faaliyet Gösteren Havayolu Şirketleri'nde Bir Uygulama [Measuring The Financial Performance and Ratio Analysis: An Application in Airway Companies Operating in The Istanbul Stock Exchange]. *Adnan Menderes Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 4(2), 87–96.
- Güngör, H. Y., & Armutlu, M. (2020). Havayolu Firmalarının Finansal Başarısızlıklarının Tahmini [Predicting Financial Distress of Air Transportation Firms]. *Turkish Business Journal*, 1(2), 150–178.
- İş Yatırım (2024). Turkish Airlines (THYAO) Stocks–Financial Statements. Accessed from the address: <https://www.isyatirim.com.tr/tr-tr/analiz/hisse/Sayfalar/sirket-karti.aspx?hisse=THYAO>
- İş Yatırım (2024). Pegasus Air Transportation (PGSUS) Stocks–Financial Statements. Accessed from the address: <https://www.isyatirim.com.tr/tr-tr/analiz/hisse/Sayfalar/sirket-karti.aspx?hisse=PGSUS>
- Karadeniz, E., & Aydın, C. (2023). Uluslararası Havayolu Yolcu Taşımacılığı Şirketlerinin Finansal Performansının Oran Analiziyle Değerlendirilmesi [Evaluation of Financial Performance of International Airline Passenger Transport Companies with Ratio Analysis]. *Muhasebe ve Finansman Dergisi*, 98, 87–108.
- Keleş, D., & Özulucan, A. (2020). Havacılık İşletmelerinde Rasyo Yöntemi ile Finansal Performans Ölçümü: Borsa İstanbul (BIST)'Da İşlem Gören İki Havayolu İşletmesi Üzerine Bir Araştırma [Measurement Of Financial Performance By Ratio Method In Aviation Enterprises: A Research On Two Airlines Enterprises Trading In The Istanbul Stock Market]. *İşletme Bilimi Dergisi*, 8(3), 503–534.
- Kiracı, K., & Asker, V. (2018). Maliyet Liderliği Stratejisini Uygulayan Havayollarının Finansal Başarısızlık Riskinin Ampirik Analizi [Empirical Analysis of The Risk of Financial Failure Of Airlines Implementing Cost Leadership Strategy]. *Cemil Meriç–10. Sosyal Bilimler ve Spor Kongresi Bildiriler Kitabı İçinde*, 884–890.
- Kiracı, K., & Asker, V. (2019). Hava Aracı Leasing Şirketlerinin Performans Analizi: ENTROPİ Temelli TOPSIS Uygulaması [Performance Analysis of Aircraft Leasing Companies: Application of ENTROPİ Based TOPSIS]. *Uluslararası İktisadi ve İdari İncelemeler Dergisi*, 24, 17–28.
- Kiracı, K., & Bakır, M. (2018). CRITIC Temelli EDAS Yöntemi Ile Havayolu İşletmelerinde Performans Ölçümü Uygulaması [Application of Performance Measurement In Airlines With CRITIC Based EDAS Method]. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 35, 157–174.
- Kızıl, C., & Aslan, T. (2019). Finansal Performansın Rasyo Yöntemiyle Analizi: Borsa İstanbul'da (Bist'de) İşlem Gören Havayolu Şirketleri Üzerine Bir Uygulama [The Analysis Of Financial Performance With Ratio Method: An Implementation On Airline Firms Listed On Borsa Istanbul (Bist)]. *MANAS Sosyal Araştırmalar Dergisi*, 8(2), 1778–1799.
- Köse, Y. (2020). Türk Havayolu Sektöründeki Önde Gelen Havayolu Şirketlerinin Finansal Başarısızlık Tahmini: Analitik Bir İnceleme [Financial Failure Prediction Of The Leading Airline Companies In The Turkish Airline Sector: An Analytical Analysis]. *Business & Management Studies: An International Journal*, 8(4), 329–346.
- Köse, Y. (2021). Havacılık Sektöründe Spesifik Finansal Oranlar: Türkiye'deki Havayolu Şirketleri Üzerine Analiz ve Değerlendirme [Aviation Sector Specific Financial Ratios: Analysis and Evaluation on Airline Companies In Turkey]. *Journal of Financial Researches & Studies/Finansal Araştırmalar ve Çalışmalar Dergisi*, 13(25).
- Macit, D., & Göçer, S. G. (2020). Havayolu İşletmelerinin Finansal Performanslarının Ölçülmesi: Pegasus Hava Taşımacılığı AŞ Ve THY AO Örneği [Measuring The Financial Performance of Airlines: Example of THY Incorporation and Pegasus Airlines Incorporation]. *Ordu Üniversitesi Sosyal Bilimler Enstitüsü Sosyal Bilimler Araştırmaları Dergisi*, 10(3), 904–918.
- Moriarty, P. (2021). Global passenger transport. *Encyclopedia*, 1(1), 189–197.
- Ömürbek, V., & Kınay, B. (2013). Havayolu Taşımacılığı Sektöründe TOPSIS Yöntemiyle Finansal Performans Değerlendirmesi [A TOPSIS Based Financial Performance Assessment Study On Airline Industry]. *Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 18(3), 343–363.
- Özbek, A., & Ghouchi, M. (2021). Finansal Oranları Kullanarak Havayolu Şirketlerinin Performans Değerlendirmesi [Performance Evaluation of Airlines Using Financial Ratios]. *International Journal of Engineering Research and Development*, 13(2), 583–599.
- Prater, E. (2024, January 13). 'Disease X' Could Cause The Next Pandemic, According To The WHO—Or Ebola, SARS, Or Nipah. 9 Pathogens Researchers Are Keeping A Watchful Eye On. *Fortune*. <https://fortune.com/well/2024/01/12/what-is-disease-x-world-economic-forum-pandemic-planning/>
- Public Disclosure Platform (2024). BIST Companies. Accessed from the address: <https://www.kap.org.tr/tr/>
- Schmitt, D., Gollnick, V., Schmitt, D., & Gollnick, V. (2016). Historical Development of Air Transport. *Air Transport System*, 19–38.
- Springate, G. L. V. (1978). Predicting The Possibility of Failure In A Canadian Firm. Unpublished MBA Research Project, Simon Fraser University, 1.

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